DETAILED ACTION

Response to Amendment

1. This Office action addresses claims 1, 4-24, 49, 52, 53, 55, 56, 58-60, and newly added claims 61 and 62. All of the claims are newly rejected under 35 USC 103, as necessitated by amendment. Accordingly, this action is made final.

Claim Rejections - 35 USC § 103

2. Claims 1, 4, 6, 7, 10, 11, 21, 23, 24, 49, 52, 59, and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 99/13522 in view of Xue (U.S. Patent 5,702,837).

WO '522 is directed to a solid oxide fuel cell assembly comprising an interconnect assembly comprising a separator plate (122), a silver alloy mesh (136) contacting one side of the plate, and a nickel mesh (144) contacting the other side of the plate (see abstract; Fig. 4). The sides of the mesh contacting the separator are "first portions" and the sides of the mesh contacting the electrodes are "second portions." The meshes are "superstructures" which comprise a woven substructure, which can be defined as a discrete portion of the superstructure. The silver in mesh 136 may be combined with another material to form a composite or may be formed on stainless steel (see abstract). The mesh is welded to a collector rod which is disposed in a groove in the separator plate, which is then sealed with a glass sealant. Thus, the mesh is "bonded" to the separator plate as recited in claims 1 and 49. Regarding claims 59 and 60, the anode is a Ni/zirconia cermet and the cathode is strontium doped lanthanum manganite. These

materials have different coefficients of thermal expansion than the silver mesh, as recited in claims 1 and 49. Further with regard to claim 23, silver is considered to be a noble metal.

However, WO '522 does not expressly teach that the mesh is permanently bonded to the electrode(s), as recited in claims 1 and 49.

Xue is directed to bonding materials for solid oxide fuel cells for anode/anode bonding or anode/interconnect bonding (see abstract).

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated by Xue to bond the mesh of WO '522 to the electrode thereof. In column 4, line 62, Xue teaches that "Advantageously, [...] said anode/interconnect bonding material provides strong bonding between anode material and interconnect material with a bond shear strength greater than one megapascal. The strong bonding preserves the integrity and functionality of the SOFC stack against vibration and disturbance occurred during operation." This disclosure would motivate the artisan to bond the electrode of WO '522 to the mesh. Although the mesh is not specifically identified as an "interconnect" in WO '522, it would function as such in the fuel cell. Thus, the teachings of Xue would be relevant to such a structure. Furthermore, a particular known technique (component bonding in SOFC stacks) was recognized as part of the ordinary capabilities of one skilled in the art. *KSR v. Teleflex*, 82 USPQ2d 1385, 127 S. Ct. 1727 (2007).

3. Claims 1, 4-9, 11-24, 49, 52, 53, 55, 56, and 58-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nazmy (U.S. Patent 5,064,734) in view of DE 19517443 in view of Xue.

Nazmy is directed to a solid oxide fuel cell comprising a solid electrolyte (1), an oxygen electrode comprising La/Mn perovskite and a fuel electrode comprising Ni/zirconia cermet (see col. 3, line 40). Interconnects (7, 10) abut each electrode and are in contact with a separator plate (4). Regarding claims 21 and 22, the interconnects can be made of NiCr alloy (see col. 3, lines 56 and 63). Regarding claims 1 and 49, the interconnects thus have a different coefficient of thermal expansion than the electrodes. Regarding claim 23, the interconnect may also comprise a noble metal coating (9) (see col. 3, line 57).

Nazmy does not expressly teach that the interconnects comprise a superstructure which comprises a woven substructure, as recited in claims 1 and 49.

DE '443 is directed to a fuel cell assembly comprising an interconnect assembly comprising a separator plate and current collectors contacting the separator plates and anodes (see translation, page 2). The current collectors are nickel-coated stainless steel wire meshes which form square, rectangular, or slanted cross-sectional channels (see Figs. 4a, 4b). The areas of the mesh contacting the separator are "first portions" and the areas of the mesh contacting the anode are "second portions." The meshes are three-dimensional "superstructures," which comprise a woven substructure. It is noted that DE '443 is primarily directed to molten carbonate fuel cells. However, on page 2 of the translation, it is stated that "thus at [sic] current collectors *to the use in gas cells*, in particular in fusion carbonate gas cells, the following demands are made" (emphasis added).

Accordingly, it is submitted that it would have been obvious to substitute the current collector of DE '443 for the current collector of Nazmy. The substitution of one known element for another would have yielded predictable results to one of ordinary skill in the art at the time of the invention. Further, as stated on page 2 of the translation of DE '443, "an advantage according to invention manufactured of the current collector consists of the fact that the mechanical and electrical characteristics can be varied by the choice of the strength and the feather/spring characteristics of the high-grade steel wire as well as by the kind of its processing within a wide range and be adapted to the respective requirements." Accordingly, it would only involve routine skill in the art to substitute the collectors (at least the shape and optionally the materials) for the collectors of Nazmy. Further, as disclosed in the passage above, although DE '443 is primarily concerned with molten carbonate fuel cells, it is not limited thereto.

Nazmy further does not expressly teach that the interconnects are permanently bonded to the separator plates and electrodes, as recited in claims 1 and 49.

Xue is directed to bonding materials for solid oxide fuel cells for anode/anode bonding or anode/interconnect bonding (see abstract).

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated by Xue to bond the current collector (interconnect) of Nazmy as modified by DE '443 to the electrode and separator plate thereof. In column 4, line 62, Xue teaches that "Advantagecously, [...] said anode/interconnect bonding material provides strong bonding between anode material and interconnect material with a bond shear strength greater than one megapascal. The strong bonding preserves the integrity and functionality of the SOFC stack against vibration and

disturbance occurred during operation." Although Xue discloses the bonding of two components (anode to interconnect), it would be obvious to bond the three components (electrode/current collector/separator plate) of Nazmy/DE '443 to obtain the disclosed advantages of preserving integrity and functionality of the SOFC stack. Furthermore, a particular known technique (component bonding in SOFC stacks) was recognized as part of the ordinary capabilities of one skilled in the art. *KSR v. Teleflex*, 82 USPQ2d 1385, 127 S. Ct. 1727 (2007).

Neither Nazmy nor DE '443 expressly teaches that the current collectors are dimpled (claims 8 and 9) or that they define sinusoidal or hourglass-shaped channels or that the connecting portions converge (claims 19, 20, 53, 55, 56, 58), or that the compliance of the current collector is within the ranges defined by claims 12-14.

However, it is submitted that the disclosure of DE '443 fairly suggests the claimed shapes and ranges of compliance. On page 3 of the translation, the reference teaches that "[v]ery different mechanical and electrical characteristics of the current collector can be achieved by the different shaping of the wire mesh, i.e. different contact areas and kiss pressures both on the side to the electrode as well as on that the bipolar plate of the gas cell turned side." Accordingly, this disclosure would motivate the artisan to change the shape of the current collector to affect the mechanical and electrical characteristics. As such, the shapes recited in the instant claims are not considered to involve an inventive step over DE '443. Additionally, the ranges of compliance recited in claims 12-14 are also not considered to involve an inventive step since the reference suggests modifying the mechanical characteristics and kiss pressure of the current collector.

Conclusion

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Crepeau whose telephone number is (571) 272-1299. The examiner can normally be reached Monday-Friday from 9:30 AM - 6:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan, can be reached at (571) 272-1292. The phone number for the organization where this application or proceeding is assigned is (571) 272-1700. Documents may be faxed to the central fax server at (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Jonathan Crepeau/
Primary Examiner, Art Unit 1795
January 5, 2009